→ cc: Rockwell Team original & Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
215 Fremont Street
San Francisco, CA 94105

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MEMORANDUM

SUBJECT: ROCKWELL INTERNATIONAL SANTA SUSANA FIELD LABORATORY
EPA ID# CAD093365437, CA1800090010, CA3890090001

FROM: Rich Vaille
Assistant Director Hazardous Waste Management Division

TO: Distribution

Enclosed for your information is the Summary Review of Preliminary Assessments/Site Inspections of Rockwell International Santa Susana Field Laboratory. A CERCLA site assessment was conducted on the facility to assess its potential to pose a significant threat to human health and the environment. This report summarizes the available data relative to the hazard ranking system model.

Additional information is required before we can conclude our evaluation of Rockwell International. Specifically, analytical data is required to determine if uncontrolled releases of trichloroethylene and other solvents from test facilities and surface impoundments are occurring via the air route. Once this information has been received and reviewed by the Superfund Field Operations Branch, we will be able to determine the site's eligibility for potential inclusion on the National Priorities List.

If you have any questions regarding this report, you may contact me or Carolyn Douglas of my staff at (415) 744-1520.

Distribution: S. R. Lafflam (Rockwell-Rocketdyne)
Dennis Dasker (LA RWQCB)
Dennis Dickerson (CA DHS)
Charles Myers (DHS-EMB)
Allen L. Danzig (VCAPCD)
Thomas Berg (VCEH)
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ecology and environment, inc.
160 SPEAR STREET, SAN FRANCISCO, CALIFORNIA 94105, TEL. 415/777-2811
International Specialists in the Environment

SUMMARY REVIEW OF PRELIMINARY ASSESSMENTS/SITE INSPECTIONS OF ROCKWELL INTERNATIONAL SANTA SUSANA FIELD LABORATORY

SUBMITTED TO: Carolyn Douglas, EPA T-4-7

PREPARED BY: Karen Johnson, Ecology and Environment, Inc.

THROUGH: Patty Cook, Ecology and Environment, Inc.

DATE: July 19, 1989

SITE: Rockwell International Santa Susana Field Lab
Simi Hills, Ventura County, California

EPA ID#: CAD093365435, CA1800090010, CA3890090001

TTD#: F9-8907-015

PROGRAM ACCOUNT#: FCAZ156SAA

FIT REVIEW/CONCURRENCE: Chris Richter, 8/7/89.

cc: FIT Master File
Tom Mix, EPA T-4-7
Rich Vaille, EPA

1. INTRODUCTION

Previous efforts to assess the hazardous waste disposal activities at the Rockwell International Santa Susana Field Laboratory (SSFL) have dealt with particular areas within the facility, but have never addressed the entire facility as a whole. Some areas within the SSFL belong to the federal government, while others are owned and operated by Rockwell International, a private corporation.

In order to determine whether the facility as a whole may be eligible for the Superfund National Priorities List, the U.S. Environmental Protection Agency (EPA) requested Ecology and Environment, Inc.'s Field Investigation Team (FIT) to conduct a review of the available documentation pertaining to hazardous waste activities at the SSFL and evaluate the facility with respect to the Hazard Ranking System set up in the Comprehensive Environmental Resource Conservation, Liability, and Compensation Act (CERCLA) of 1980. EPA's strategy for determination of further action under CERCLA is based solely on a site's potential to

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achieve a Hazard Ranking System (HRS) score high enough for the site to qualify for inclusion on the National Priorities List (NPL).

In order to present an overview of the entire facility, several reports have been revieved and summarized. The primary sources of information for this reviev included:

- Preliminary Assessment Report, Santa Susana Field Laboratory-Area II, Rockwell International-Rocketdyne Division, by Groundwater Resources Consultants, Inc., dated March 3, 1988.
- Hydrogeologic Assessment Report, Santa Susana Field Laboratory, Rockwell International-Rocketdyne Division, by Groundwater Resources Consultants, Inc., dated November 30, 1987.
- Preliminary Assessment of the Former Sodium Burn Pit, Rockwell International Santa Susana Field Lab, by Karen Johnson, Ecology and Environment, Inc.
- Preliminary Assessment of the Construction Materials Landfill Area, Rockwell International Santa Susana Field Lab, by Karen Johnson, Ecology and Environment, Inc.
- Preliminary Assessment Summary of Rockwell/Rocketdyne Santa Susana Field Laboratory, Simi Hills, California, by Adam S. Ng, ICF Technology Inc. for EPA-PIT, dated December 14, 1987.
- Rockwell International-Energy Technology Engineering Center, CERCLA Program Phase II - Site Characterization, dated May 29, 1987.
- Rockwell International-Energy Technology Engineering Center, CERCLA Program Phase I - Installation Assessment for DOE Facilities at SSFL, dated April 25, 1986.
- Environmental Survey Preliminary Report, DOE Activities at Santa Susana Field Laboratories, Ventura County, California, by U.S. Department of Energy, Office of Environmental Audit, dated February 1989.

2. SITE DESCRIPTION

The Rockwell International Santa Susana Field Laboratory (SSFL) is located in the Simi Hills in the southeastern portion of Ventura County, adjacent to the Los Angeles County line (see Figure 1). It lies on an elevated plateau in rugged terrain south of Simi Valley, California and west of Chatsworth, California on Woolsey Canyon Road, Simi Hills, California.

The SSFL is divided into four areas designated I, II, III, and IV. Areas I and III (CAD093365435) are owned and operated by the Rocketdyne Division of Rockwell International. Area IV is also owned by Rockwell, but is operated under the Atomics International or Energy Systems Group.

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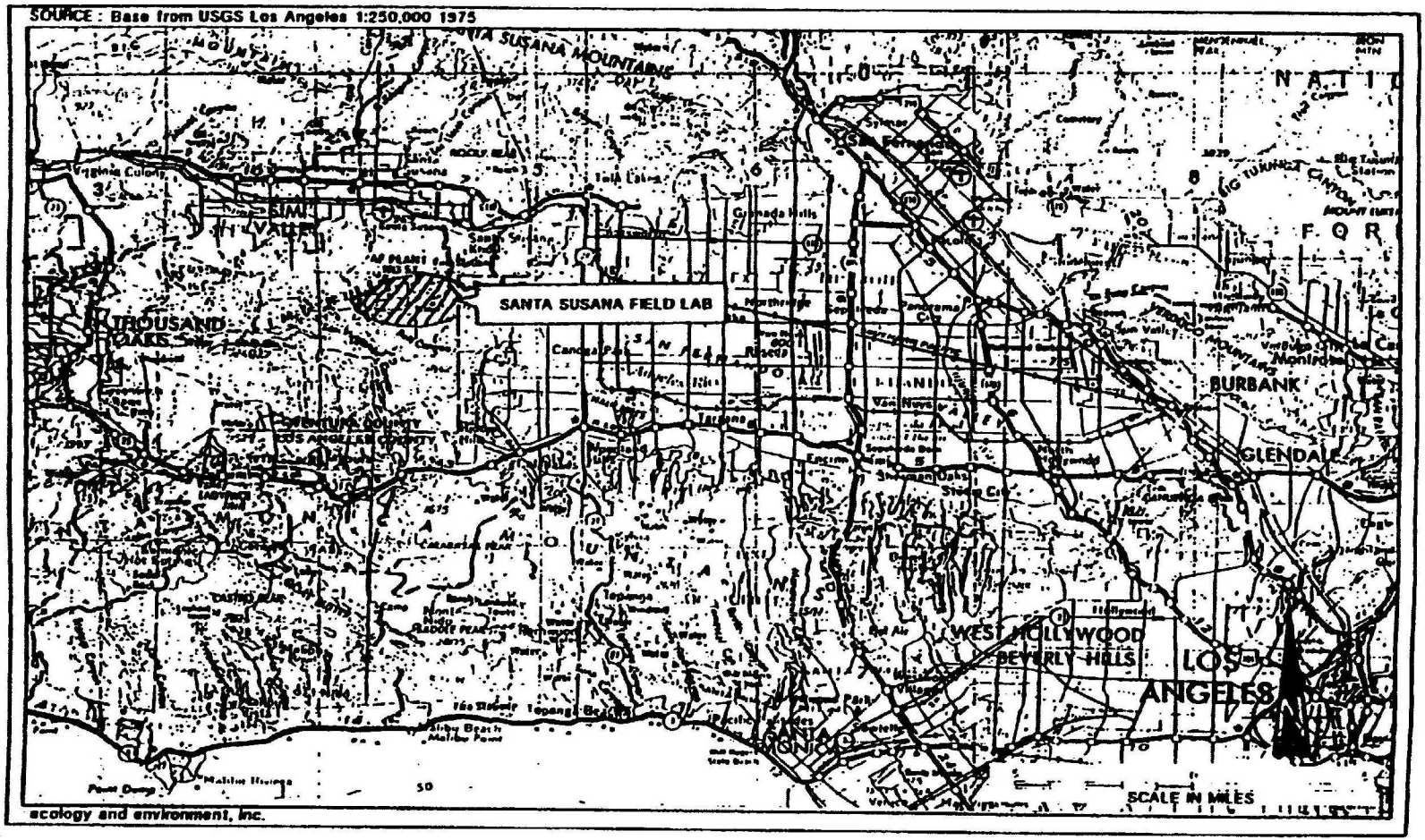

Figure 1 LOCATION OF ROCKWELL INTERNATIONAL SANTA SUSANA FIELD LAB

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A 90.26-acre parcel of land in Area IV has been optioned by the Department of Energy (DOE), and is the site of DOE's Energy Technology Engineering Center (ETEC) (CA3890090001). Area II (CA1800090010) is owned by the National Aeronautics and Space Administration (NASA), and has been operated by Rockwell/Rocketdyne as a product testing facility since 1949 (see Figure 2).

The operations at the SSFL consist of the research, development, and testing of rocket engines, lasers, nuclear reactors, coal gasification and liquifaction processes, and other related technologies. Chemicals used in these operations include organic solvents, chiefly trichloroethylene (TCE), hydrazine fuels, oxidizers, kerosene-based fuels, and liquid metals such as sodium and potassium. In addition, asbestos, polychlorinated biphenyls (PCBs), and hydraulic oil have been used throughout the site. Because of the development and testing of nuclear reactors in Area IV, radioactive vastes have also been stored on-site.

The largest quantity of wastes generated came from the use of organic solvents at the large rocket test stands in Areas I and II. Before 1976, TCE was the primary solvent used to wash down equipment and flush engine thrust chambers. A TCE reclamation system was established around 1960, but was reportedly unreliable (1).

Rockwell/Rocketdyne manages a contamination control system (also referred to as the water reclamation system) at the SSFL that consists of 28 surface impoundments designed to collect cooling and rinse water, storm runoff, and accidental spills from Areas I, II, and III (see Figure 3). Some activities in Area IV also discharge to the system through unlined ditches, but no surface impoundments were located in that Area IV.

Eleven of the ponds were designated as hazardous vaste facilities under the Resource Conservation and Recovery Act (RCRA) of 1976 (2). Tvo of the ponds, the Engineering Chemistry Lab (ECL) pond in Area III and the Laser Engineering Test Facility (LETF) pond in Area I, were reportedly the only impoundments that vere part of the water reclamation system that stored and treated hazardous vastes on a routine basis. The ponds vere excavated in 1984 and the material was sent to a Class I disposal facility (1). The constituents of the soil material vas not determined for this report. The use of the other nine impoundments vas discontinued in 1985 and they are undergoing RCRA closure.

In addition to the surface impoundments, there are at least 17 known areas vhere vaste materials were stored or treated. Many of these areas lacked the proper containment facilities to prevent a release of contaminants to the environment in the event of improper storage or spills. A summary of all of these potential vaste management facilities including their reported use and vastes handled is provided in Table 1.

The SSFL is a large facility and has conducted many different operations over the years. It vas not within the scope of this assessment to identify the potential existence of additional vaste management areas that have not been addressed by previous investigations.

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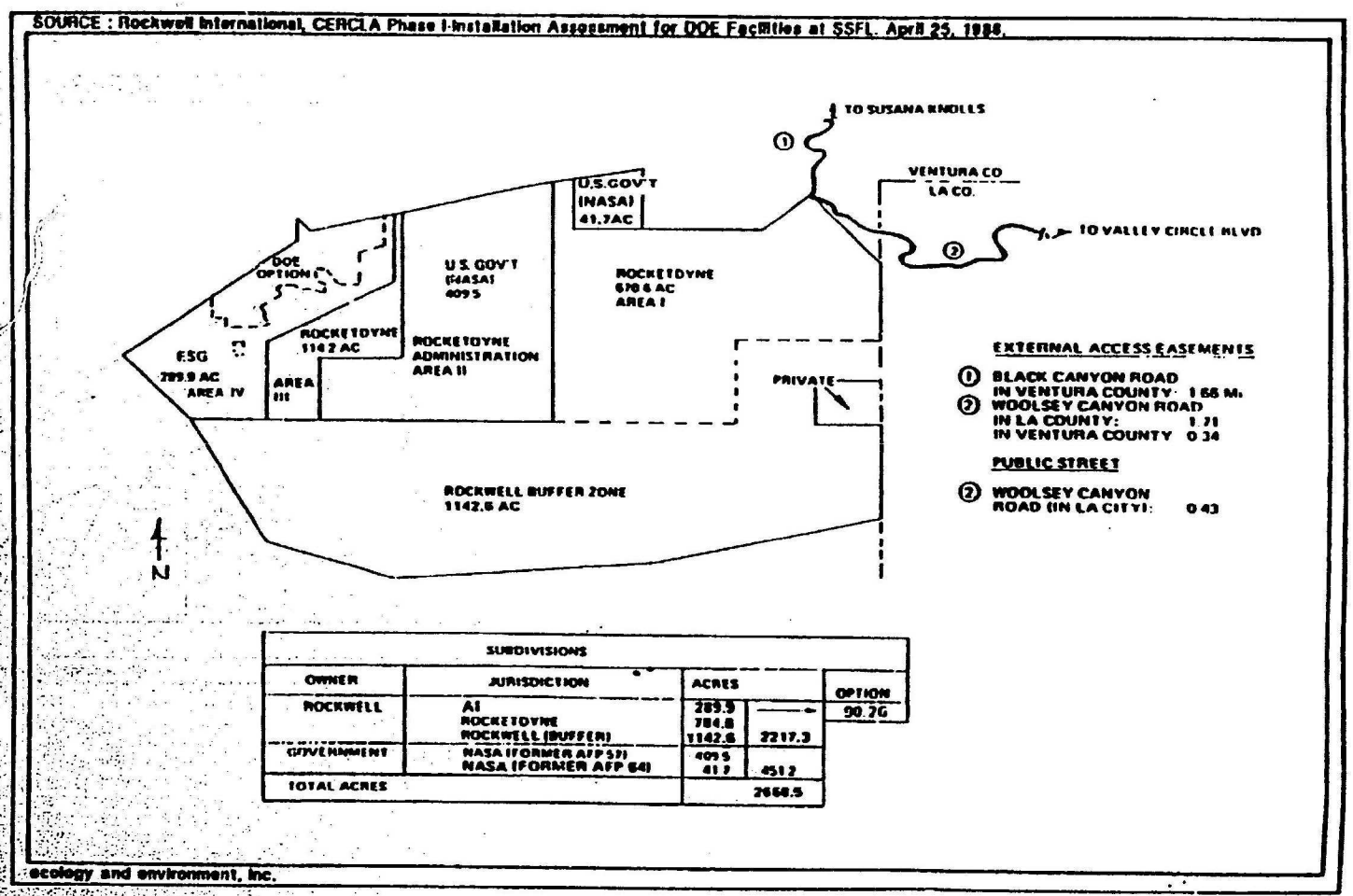
SOURCE : Rockwell International, CERCLA Phase I-Installation Assessment for DOE Facilities at SSFL, April 25, 1988.
TO SUSANA KNOLLS
VENTURA CO
LA CO.
TO VALLEY CIRCLE BLVD
U.S.GOV'T (NASA) 41.7AC
DOE OPTION
U.S. GOV'T (NASA) 409.5
ROCKETDYNE 670.6 AC AREA I
ROCKETDYNE 1142 AC
ROCKETDYNE ADMINISTRATION AREA II
ESG 290.9 AC AREA IV
AREA III
PRIVATE
ROCKWELL BUFFER ZONE 1142.6 AC
N
EXTERNAL ACCESS EASEMENTS
① BLACK CANYON ROAD IN VENTURA COUNTY: 1.66 M.
② WOOLSEY CANYON ROAD IN LA COUNTY: 1.71 IN VENTURA COUNTY 0.34
PUBLIC STREET
② WOOLSEY CANYON ROAD (IN LA CITY): 0.43
SUBDIVISIONS
OWNER | JURISDICTION | ACRES | | OPTION
ROCKWELL | AI | 289.9 | | 90.26
ROCKETDYNE | 784.8 | |
ROCKWELL (BUFFER) | 1142.6 | 2217.3 |
GOVERNMENT | NASA (FORMER AFP 57) | 409.5 |
NASA (FORMER AFP 64) | 41.7 | 451.2
TOTAL ACRES | | 2668.5
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Figure 2 AREAS WITHIN SANTA SUSANA FIELD LAB

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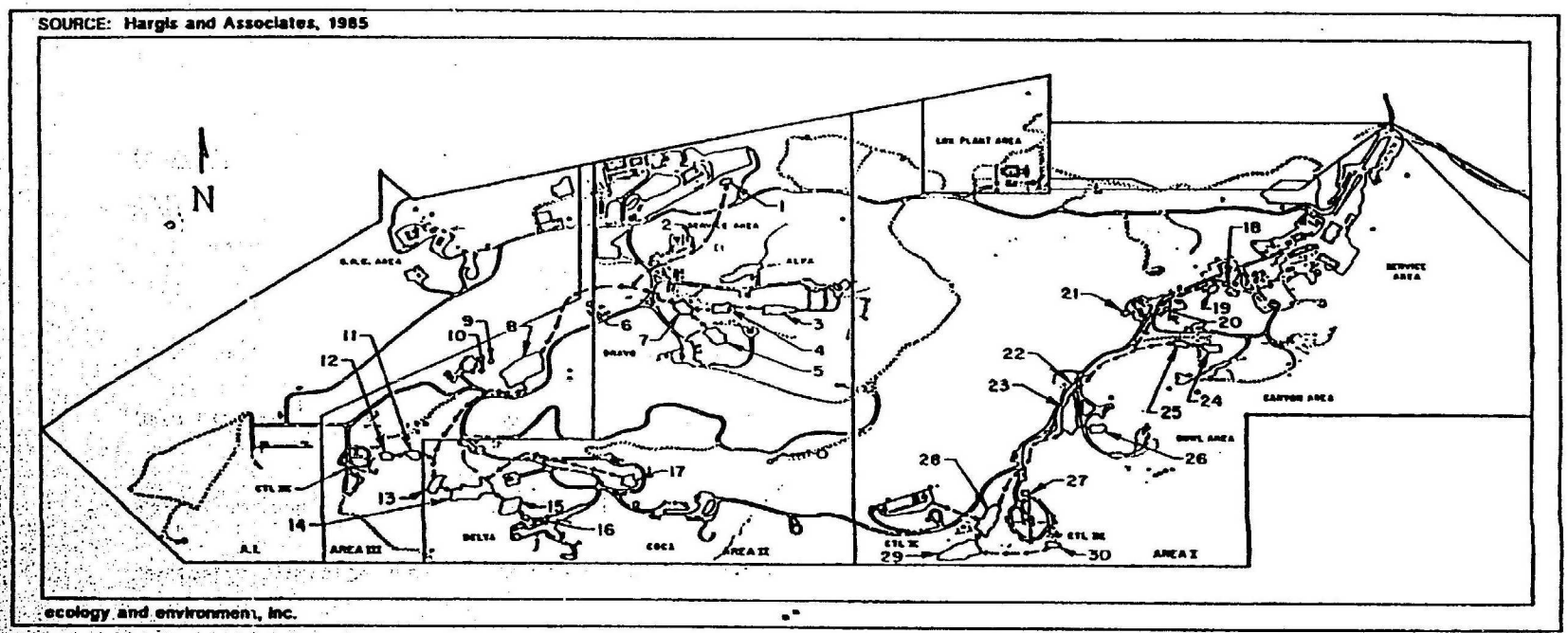

Figure 3 CONTAMINATION CONTROL SYSTEM
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TABLE 1

WASTE MANAGEMENT FACILITIES
Santa Susana Field Laboratory
Rockwell International Corporation - Rocketdyne Division
Simi Hills, Ventura County, California

FACILITY	USE	WASTE
AREA I		
APTF Ponds[2] #1 #2	Cooling water catchment and Emergency Spill Containment and Treatment	Kerosene-based fuels (skimmed off) Nitric Acid (D002) (neutralized) Monomethylhydrazine (P068) (treated with hydrogen peroxide, if spilled)
LETF Pond[2]	Waste Treatment and Storage	Corrosive liquids - NaOH, NaF - (Held fo disposal in Class I landfill)
Burn Pit Area[1]	Waste Treatment and Storage	Solid Propellants and Explosives (burned and disposed of in Class I or regular landfill depending on constitnents
Potassium Loop[3]	Inactive Testing Facility	Metallic potassium meal (D003) - avaitin closure
Perimeter Discharge Pond	Water Containment and Storage	Kerosene-base Fuel, Nitric Acid, Monomethyl Hydrazine, Trichloroethene, 1,1,1-Trichloroethane, Freon, Corrosive Liquids
R-1 Reservoir	Water Storage	Kerosene-base Fuel, Nitric Acid, Monomethyl Hydrazine, Trichloroethene, 1,1,1-Trichloroethane, Freon, Corrosive Liquids

1 - Active RCRA Facility
2 - Undergoing RCRA Closure-Not Used Since November 1985
3 - Already Closed Under RCRA

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6 ACT

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FACILITY	USE	WASTE
AREA I (con't)		
Bowl Skim Pond[5]	Catchment for Bowl Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
Bowl Retention Pond[5]	Catchment for Bowl Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
Canyon Retention Pond[5]	Catchment for Bowl Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
Canyon Skim Pond[5]	Catchment for Bowl Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
CTL III Skim Pond		
#1	---	---
#2	---	---
AREA II		
SPA Ponds[2]		
#1	Container Rinsate and Emergency Spill Containment and Treatment	1,2-Dimethyl hydrazine (U099), monomethy hydrazine (P068), nitrogen tetroxide, hydrogen peroxide (hydrazines treated with hydrogen peroxide in event of spill
#2		
MMH Pond[2] (aka: PLP impoundment)	Spill Containment and Treatment	Monomethyl hydrazine nitrogen tetroxide, (hydrogen peroxide used if spilled)

2 - Undergoing RCRA Closure--Not used since 1985
5 - Inactive
--- No information available

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FACILITY	USE	WASTE
AREA II (con't)		
Delta Impoundment[2]	Rinsate and Spill Containment	Inhibited Red Fuming Nitric Acid (oxidizer), cryogenic fluorine and hydrogen, kerosene-based fuels, hydrazines, chlorinated and flourinated solvents.
ABSP Pond[2]	Cooling water catchment and Spill Containment	Kerosene-based fuels (skimmed off), chlorinated solvents, hydraulic oil.
Alfa Tank[4]	Storage Tank	Stores spent TCE until removed for reclamation
PCB Storage Area[1]	Drum Storage	PCBs and Hazardous Wastes
Hazardous Waste Storage[1]	Drum storage area	Solvents, alcohol, kerosene, oil, paint thinner, turco descalent, and lab packs
Bravo Skim Pond	Catchment for Bravo Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
Alfa Skim Pond	Catchment for Alfa Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
Alfa Retention Pond	Catchment for Alfa Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon
Coca Skim Pond[5]	Catchment for Coca Test Area Emergency Spill Containment	Kerosene-base Fuel, Trichloroethene, 1,1,1-Trichloroethane, Freon

1 Active RCRA Facility
2 Undergoing RCRA Closure-Not Used since 1985
4 Generator Only
5 Inactive

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FACILITY	USE	WASTE
AREA II (con't)		
R-2A Discharge Pond	Water Containment and Storage	Kerosene-base Fuel, Isopropyl Alcohol, Trichloroethene, 1,1,1-Trichloroethane, Freon, Hydrogen Peroxide, Monomethyl Hydrazine
R-2B Discharge Pond	Water Containment and Storage	Kerosene-base Fuel, Isopropyl Alcohol, Trichloroethene, 1,1,1-Trichloroethane, Freon, Hydrogen Peroxide, Monomethyl Hydrazine
CTL II Retension Pond	---	---
Flowmeter Catch Pond	---	---
AREA III		
ECL Pond[3]	Treatment and Storage	Sodium hydroxide, methylene chloride, dimethyl sulfoxide, sodium azide, and other chemicals depending on current contract.
STL-IV Ponds[2] #1 #2	Cooling water catchment and spill containment	Monomethyl hydrazine, nitrogen tetroxide chlorinated and flourinated solvents
Compound A	Wastewater catchment	Hydrofluoric acid
Silvernale Reservoir	Water Storage	Kerosene-base Fuel, Nitric Acid, Trichloroethene, 1,1,1-Trichloroethane, Freon, Hydrogen Peroxide, Monomethyl Hydrazine

1. Active RCRA Facility
2. Undergoing RCRA Closure-Not Used Since November 1985
3. Already Closed Under RCRA
--- No information available

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FACILITY	USE	WASTE
AREA IV		
Sodium Burn Pit (B886)	Treatment and Disposal	Metallic sodium, NaK, kerosene, organic solvents, diesel fuel, oil and gease, PCBs, PCTs, terphenyls and biphenyls, cesium-137
SRE Watershed	Runoff from SRE buildings	Asbestos
SNAP Reactor Bldg. (B059)	Groundwater contamination from Bldg. 059	Cobalt-60, chlorinated solvents
Old Landfill	Drum Storage or disposal	Oil and grease, alcohols, sodium and sodium reaction products, phosphoric acid, and asbestos
RMDF Leachfield	Accidental release of contaminated wastewater	Strontium-90 and Yttrium-90
Old Conservation Yard	Drum and equipment storage	Unknown
ESADA Chemical Storage Yard	Drum Storage	Alcohols and unknown others
Building 100 Trench	Burning and Disposal	Construction debris and possibly hazardous wastes
S.E. Drum Storage Yard	Drum Storage	Unknown
New Conservation Yard	Drum and equipment storage	Unknown
Sodium Burn Facility (B133)	Equipment Storage	Metallic sodium - high pH soils

1 Action RCRA Facility

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3. HRS FACTORS

3.1 HRS Summary

The Hazard Ranking System (HRS) was designed to evaluate the relative potential impact of uncontrolled hazardous substance releases to human health or the environment. The HRS models the potential contamination migration pathways of groundwater, surface vater, and air. Within each pathway, the likelihood of release, waste type and quantity, and target populations are evaluated. Changes in the HRS model have been proposed as a result of the Superfund Amendments and Reauthorization Act (SARA) that will address an on-site pathway and extend some of the target radii. This site was primarily evaluated under the original HRS model; however, proposed HRS changes were addressed for their effect on this site's eligibility for NPL listing.

As stated earlier, EPA determines whether further action under CERCLA is warranted based solely on a site's potential to achieve an HRS score high enough to qualify for inclusion on the National Priorities List (NPL). Because a site's HRS score is intended to reflect the magnitude of potential risk to human health or the environment, a low potential target population influences the site's potential to be eligible for NPL listing.

This is the case with the SSFL. Groundvater is not used as a primary source of drinking water in the area. Most of the population within a three-mile radius of the facility uses vater delivered by the Metropolitan Water District of Southern California from distant surface water sources. The local stream channels carry only intermittent surface water that is not used for any purpose. Although there are both confirmed and potential contaminant releases to the groundwater and surface vater from the SSFL, as this report describes, the site does not appear to be eligible for inclusion on the NPL due to the small potential drinking water target population.

3.2 Observed Release

To document an observed release of contaminants to one of the three migration pathways (groundvater, for instance), there must be direct analytical data shoving that the groundwater in the vicinity of the facility contains contaminants at a significantly higher concentration than background levels. In addition, the contaminant must be attributed to the facility.

There has been an observed release of hazardous substances to groundvater from the activities at the SSFL. Rockvell began an intensive groundvater investigation at the SSFL in early 1984. This investigation shoved that groundwater beneath the facility was contaminated with organic solvents, predominantly TCE. TCE has been found in samples from observation vells around the facility in concentrations as high as 5,200 micrograms per liter (ug/l) (4). Although other volatile organic compounds (VOCs) such as trans-1,2-dichloro- ethylene, vinyl chloride, Freon-113, toluene, isopropanol, and benzene have also been detected, TCE is considered the primary contaminant from the site. The VOCs observed in the groundvater

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samples came primarily from the use of solvents at the rocket engine test stands. Other suspected sources are the pavement washdown areas, laboratory solvent use areas, and impoundments that received spills or discharges (2). The groundwater beneath the facility forms a regional groundwater high, so there are no upgradient sources of contaminants and background levels should be zero.

Although VOC contamination has been documented beneath the facility, existing off-site data does not show that any contamination has migrated off-site. This may be due to the complex nature of the groundwater system (see 3.4 Groundwater) and the sparce off-site monitoring data. There is believed to be a large cone of depression in the groundwater beneath the facility resulting from long-time withdravals of groundwater for industrial uses that may have prevented the off-site migration of groundwater contaminants (4).

There are two areas of suspected radioactive contamination of groundwater in Area IV. The subterranean levels of Building 059 formerly housed the Space Nuclear Auxiliary Power (SNAP) prototype reactor and contain sand and equipment contaminated with cobalt-60. Groundwater has seeped into the building and has become radioactively contaminated. A program of controlled groundwater pumpage has lowered the groundwater level beneath the building and kept a water level depression in the area to prevent the migration of contaminated water away from the building. There has been insufficient monitoring around the area to determine the extent of groundwater contamination and whether any radioactive contamination has migrated from the building area (5).

In the 1970s, there was an accidental spill of radioactively-contaminated water from a tank in the Radioactive Materials Disposal Facility (RMDF) area. While investigating the results of this spill radiation was found in the soil beneath the RMDF leachfield. It is believed that in the early 1960s, water containing strontium-90 and yttrium-90 was accidentally released to the sanitary sewer leachfield for the RMDF. After finding this contamination, the soil in the area was excavated and the joints and fractures in the Chatsworth Formation were sealed with asphalt. However, there is still a high probability that radioactive contaminants have been released to the groundwater beneath this area. This potential observed release has not been fully investigated (5).

There has been no observed release of contaminants to surface water documented from the site. Surface runoff contaminated with metals, VOCs, and asbestos has been detected, but there has not been sufficient monitoring to determine if this contamination has reached any surface water bodies. Therefore, an an observed release to surface water has not been established (See Section 3.5 Surface Water).

3.3 Waste Type and Quantity

Since 1949, the SSFL has been the site of a vide variety of research, development, and testing activities. Chemicals used in these operations include organic solvents, chiefly TCE, hydrazine fuels, oxidizers, kerosene-based fuels, and liquid metals, such as sodium and potassium.

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In addition, asbestos, PCBs, and hydraulic oil have been used throughout the site. Because of the development and testing of nuclear reactors in Area IV, radioactive wastes have also been stored on-site.

The SSFL contamination control system (also referred to as the water reclamation system) consisted of 28 surface impoundments designed to collect cooling and rinse water, storm runoff, and accidental spills from throughout Areas I, II, and III. Some activities in Area IV also discharge to the system through unlined ditches, but no surface impoundments were located in Area IV.

The Hydrogeologic Assessment Report prepared by Groundvater Resources Consultants, Inc. in 1988 in response to the Toxic Pits Cleanup Act of 1984 gives a detailed estimate of the types and quantities of wastes received by nine of the surface impoundments located in Areas I, II, and III. These impoundments were used as cooling water, rinse water, or accidental spill containment facilities. The wastes collected in these impoundments primarily consisted of organic solvents, hydrazine fuels, oxidizers, and kerosene-based fuels. The report estimated that approximately 870 tons of wastes have been deposited in these impoundments over the last 25 years. Many of the impoundments were unlined. The concrete lining in the other ponds was not adequately maintained and inspection reports showed that most of them contained cracks. No leachate recovery systems were installed at the impoundments (2).

The Laser Engineering Test Facility (LETF) pond in Area I and the Engineering Chemistry Laboratory (ECL) pond in Area III were reported to be the only surface impoundments that stored and treated hazardous wastes on a routine basis within Areas I, II, or III (1). The LETF pond held corrosive liquids, such as sodium hydroxide and sodium fluoride, before removal to a Class I disposal facility. The ECL pond received a wide variety of wastes depending on their contracts. Records show that these wastes included sodium hydroxide, methylene chloride, dimethyl sulfoxide, and sodium azide. Both of these ponds were excavated in 1984 and the materials transported to an off-site Class I disposal facility (1).

In addition to these surface impoundments, there are several drum and equipment storage areas that were not properly regulated or managed for the containment of spills, and may have released contaminants to the environment. The Hazardous Waste Storage Facility in Area II is used to store drums of nonreactive hazardous wastes generated throughout the SSFL. The facility does not have sufficient impervious paved areas and diking to properly contain wastes in the event of drum leakage. The facility is not roofed and drums of solvents have bulged as a result of heating by the sun. The area is RCRA permitted and has received several violations during regulatory inspections. Rockwell is negotiating with NASA to obtain funding to solve the problems at this facility (5).

A survey of Area IV performed in February 1989 found 35 55-gallon drums of reactive metal stored near the SNAP facility (Bldg 029). These drums contained sodium, potassium, sodium-potassium, zirconium hydride, and lithium awaiting treatment at the Sodium Burn Facility or removal.

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Eighty-nine drums containing such materials as oils, alcohols, sodium and sodium reaction products, grease, phosphoric acid and asbestos were removed in the early 1980s from an unregulated temporary drum storage area referred to as the Old Landfill in Area IV (7). Hydrocarbon and cesium-137 contamination was detected in the soils at the Old Conservation Yard (6). Aerial photographs showed that hundreds of drums were stored there in the 1960s and 1970s with no containment structures. There is a RCRA-regulated PCB storage area in Area II where drums of PCBs and other hazardous wastes are stored. This area is properly enclosed and seems to be in compliance with its RCRA permit.

Although records that document the type or amount of wastes disposed of at the Old Sodium Burn Pit in Area IV are not available, the amount of soil contamination found there during a DOE-CERCLA investigation indicates that the quantity of wastes disposed of was significant. An area of approximately 50,000 square feet was found to be contaminated with VOCs, metals, oil and grease, PCBs, polychlorinated terphenyls (PCTs), terphenyls, and biphenyls. In addition, radioactive cesium-137 was found in soil samples in this area (7).

Area IV has been the site of the Liquid Metal Breeder Reactor Program since 1966. Radioactive wastes from this program consist of both high-activity and low-level wastes. High activity wastes generally contain activation products such as cobalt-60 from fuel contact. Process operations and cleanup activities generate low-level wastes contaminated with uranium, thorium, or plutonium. A small quantity of wastes is generated from research programs (5).

The handling of radioactive wastes, including treatment and storage, takes place at the Radioactive Materials Disposal Facility (RMDF). Waste treatment consists of the solidification and evaporation of low-level wastes. These wastes are then placed in 55-gallon drums for shipment to an off-site radioactive waste disposal facility. In February 1989, 11 drums containing low-level transuranic (TRU) wastes (by-products of uranium decay), were in storage (5).

High-activity materials such as irradiated fuel elements are not treated on-site. They are stored in below-grade vaults designed for the storage of fuel elements or high-activity wastes (5). Existing information does not indicate if these wastes are transported off-site for final disposal, or accumulated in the vaults.

There are two areas of suspected radioactive contamination of groundwater. The subterranean levels of Building 059 that formerly housed the Space Nuclear Auxiliary Power (SNAP) prototype reactor contain sand and equipment contaminated with cobalt-60. Groundwater has seeped into the building and has become contaminated. A program of controlled groundwater pumpage has lowered the groundwater level beneath the building and kept a water level depression there to prevent the migration of contaminated water from the building. There is insufficient monitoring around the area to determine if the program has been successful (5).

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Sometime in the early 1960s, radioactively-contaminated water containing strontium-90 and yttrium-90 was released to the soil in and beneath a sanitary sewer leachfield for the RMDF. The soil in the area was excavated and the joints and fractures in the Chatsworth Formation were sealed with asphalt, but there is still a high probability that contaminants reached the groundwater in this area. This likelihood has not been investigated further (5).

3.4 Groundwater

The principal aquifers at the SSFL are the upper Cretaceous Chatsworth Formation and Quaternary alluvium. The Chatsworth Formation is composed primarily of well-consolidated, massively-bedded sandstone with interbeds of siltstone and claystone. The occurrence and movement of groundwater in the Chatsworth Formation is controlled by a well-developed system of fractures and joints. Permeabilities in this formation range from approximately 0.01 to 1,000 gallons per day per square foot (gpd/ft^2). The wide range in permeability values can be attributed to the fractured nature of the formation (7). This fracture system also makes it difficult to predict groundwater movement. The depth to groundwater in wells completed in the Chatsworth Formation ranges from a few feet to more than 300 feet (2).

Throughout the facility, a discontinuous layer of alluvium overlays the Chatsworth Formation. This alluvium consists primarily of unconsolidated sand, silt, and clay that has been eroded from the surrounding Chatsworth and Martinez Formations. (The Martinez Formation is not saturated anywhere underlying the SSFL, and is therefore irrelevant to the groundwater discussion.) This alluvium or Shallow Zone aquifer is only saturated along ephemeral drainages and in the southern part of Burro Flats. Some portions of the alluvium are saturated only in the wet season. The depth to groundwater from Shallow Zone monitor wells ranges from four to 33 feet (2).

Groundwater in the fractures of the Chatsworth Formation occurs under both confined and unconfined conditions. In some areas of the facility, the two groundwater systems appear to be hydraulically interconnected. In other areas, however, the Shallow Zone aquifer is separate and distinct from the Chatsworth Formation groundwater system as evidenced by vastly different water level elevations and contaminant concentrations. In these areas, however, it is still likely that the Shallow Zone transmits groundwater and contaminants to the underlying fractured Chatsworth Formation (4).

The groundwater beneath the facility in both the Shallow Zone and the Chatsworth Formation has been contaminated with volatile organic compounds. TCE was found in samples from well RD-4 near the Bravo test area in Area II at concentrations of up to 5,200 ug/l (4). Groundwater samples from several areas throughout the facility detected TCE in concentrations exceeding 1,000 ug/l. Other commonly detected contaminants include trans-1,2-dichloroethylene, vinyl chloride, and trichlorotrifluoroethane (Freon 113). In spite of the long history of solvent usage at the facility and the high levels of TCE found beneath the site, no off-site wells have shown groundwater contamination. The

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pumpage of groundwater from the facility's water supply wells for industrial usage has reportedly created a large cone of depression that may have trapped the contaminants beneath the site (4). Additional off-site monitoring is needed to confirm this assumption.

There is potential radioactive contamination of the groundwater from two sources in Area IV: the SNAP reactor facility (BLDG 029) and the RMDF leachfield. Additional monitoring in the area of these facilities is needed to determine the presence and extent of radioactive contamination.

The groundwater in the Chatsworth Formation is not used as a major source of drinking water. The SSFL is provided with bottled water from several licensed suppliers for use as drinking water. The Metropolitan Water District of Southern California supplies the local water purveyors with drinking water from imported surface water. No municipal drinking water is derived from groundwater. The Southern California Water Company, a community water purveyor, has a stand-by well within three miles of the SSFL, but the well has not been used in at least 10 years (8).

A preliminary assessment for Area II performed in 1988 identified 400 private domestic wells within three miles of the facility (9). A well canvass performed for the facility's RCRA permitting process in 1984 identified 16 wells within one mile of the site, 15 of which were inactive (no operable pump installed) (10). The sixteenth well was only used for lawn irrigation. A hydrologist for the Ventura County Department of Water Resources felt that "many" of the 400 domestic wells may be inactive. This is based on the current availability of municipal water supplies and the relatively high salinity of the groundwater.

The mean total dissolved solids concentration found in samples from the Chatsworth Formation wells on-site is approximately 670 milligrams per liter (mg/l) (4). The California Recommended Maximum Contaminant Level (MCL) for total dissolved solids is 500 mg/l, indicating that the water from the Chatsworth Formation may be more saline than is acceptable for drinking water usage.

The SSFL has 17 water supply wells that were constructed prior to 1960. These wells provide about 58 million gallons of water per year for sanitary, cooling, and other industrial uses (2). The net seasonal precipitation for the area is about 1.5 inches per year (12).

3.5 Surface Water

The SSFL is located on a plateau in the Simi Hills. Ninety percent of the facility drains to the southeast through Bell Canyon Creek (7). Approximately five miles from the site, this creek joins the Los Angeles River, which flows through Los Angeles to the Pacific Ocean at Long Beach (13). The other 10 percent of the site drains north into the Simi Valley through ephemeral drainages in Runkle and Meier Canyons. These canyons meet up with Arroyo Simi or Conejo Creek about three miles north of the facility. These streams merge near Camarillo to form Calleguas Creek, which then flows to the Pacific Ocean at Point Hagu (2).

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Surface water drainage from most of the site is regulated by a series of artificial drainages and impoundments designed to retain and recover industrial water, rainfall, and treated sewage treatment plant effluents for testing and recycling. Discharges to Bell Canyon Creek are only made after periods of heavy rainfall. The facility has an NPDES permit allowing it to discharge up to 160 million gallons of treated water per year from two discharge points. However, even in years with heavy rainfall, the volume of water actually released is much smaller than permitted. The facility maintains nearly total compliance with its discharge quality requirements (5).

In 1987, in compliance with Proposition 65, Rockwell conducted a study of surface runoff waters that are not part of the regulated surface water drainage. Nine sampling locations were identified throughout the SSFL. The samples were compared to the MCLs for drinking water, although the runoff from the site is not used for that purpose. The MCL for arsenic was exceeded at seven of the nine locations. The sample collected near the old sodium burn pit in Area IV exceeded the MCLs for arsenic, chromium, and lead. Methylene chloride was detected in two samples at levels that exceeded the California Department of Health Service action level of 40 ug/l. The sample from the area behind Building 133 in Area IV shoved levels of asbestos at 4,546 mg/l. The content of chrysolite fibers was 165 million fibers per liter which is greater than the California proposed "significant risk level" of 140 million fibers per liter for ingesting asbestos fibers from drinking water (5).

Although the runoff from some areas of the site did contain significant amounts of contaminants, it is not known if these contaminants were released to any off-site surface water bodies. The drainages to the north of the facility only have water in them during periods of heavy rainfall. The runoff from the site may have infiltrated into the soil before reaching a surface water body. The 1-year, 24-hour rainfall for the area is about three inches (12).

Due to the ephemeral nature of all of the surface water drainages near the site, surface water is not used in this area. During periods of high rainfall, the water that flows through the Arroyo Simi and Los Angeles River is sometimes diverted and used for groundwater recharge, but that occurs further than three miles from the site (14).

There are three bird species classified as endangered with geographic ranges or habitat preferences that include the Simi Hills: the southern bald eagle, prairie falcon, and American peregrine falcon. There are also three endangered plant species likely to be found in the Simi Hills: Dudlega cymosa, Dicentra ochroleuca, and Eriogonum crocatum. However, there is no information available to determine whether these sensitive environments can be found within two miles of the site or along the appropriate water ways (15). A federally listed endangered bird species, the least Bell's vireo has been observed in Arroyo Simi, but this habitat is greater than three miles from the site.

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3.6 Air

Air pollution controls and permits at the SSFL are regulated by the Ventura County Air Pollution Control District (VCAPCD). Most of the permitted facilities are conventional combustion units, with the exception of the coal gasification unit, the sodium heaters, the low nitrous and sulfurous oxide combustor, and the sodium burn facility. VCAPCD inspects the facility regularly and has found it in full compliance with its permits (16).

TCE and other organic chemicals are highly volatile, and with the high concentrations of TCE found in the groundwater, the potential for a release of contaminants to the air due to the use of contaminated groundwater must be considered. There are two carbon adsorption/air stripping towers that operate as part of the on-site groundwater extraction and treatment program. VCAPCD claims that no detectable concentrations of TCE are being released from these towers (16).

TCE-contaminated groundwater is used to flush rocket engines after testing. The flush water is made up of about 15 percent groundwater with an average TCE concentration of 600 ug/l . The other 85 percent of the flush water is supplied municipal water. Approximately 80 to 300 gallons of water are used in a five minute period for each test (16). Because of the low volume of contaminated water used and the short duration of the flush, the amount of TCE potentially released to the air from these operations is probably low.

TCE is also still used as a solvent flush following rocket engine tests (3). There is reportedly a TCE capture system in place, but the details were not available for this report. It is not known if any TCE is released to the air or the surface water impoundments from these tests. TCE in the surface impoundments would evaporate into the air, the amount depending on its concentration. Additional information is needed to determine if these testing sites and surface impoundments may potentially release hazardous concentrations of TCE to the air.

In the early days of rocket testing, rocket fuels contained high levels of beryllium. Particles of beryllium were released to the air and settled on the soil around the facility. Rockwell states that the beryllium-contaminated soils were removed after the use of beryllium-containing fuels was discontinued. There is some concern, however, that there may still be concentrations of beryllium in the soil that, when picked up by the wind, could pose a threat to human health (17).

Radionuclides have been emitted from three sources in Area IV of the SSFL: the Radioactive Material Disposal Facility (RMDF), the Hot Laboratory, and the Nuclear Materials Development Facility (NMDF). The RMDF consists of several buildings where radioactive wastes are decontaminated and packaged for off-site disposal. The Hot Laboratory is used principally to examine irradiated fuel and prepare it for reprocessing. It is licensed by the Nuclear Regulatory Commission (NRC) under Special Nuclear Materials License SNM-21. The Hot Laboratory has been undergoing reconstruction since 1987, and operations involving

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radioactive materials have temporarily ceased. The NMDF was constructed for research and production work involving highly radioactive fuels. It was also licensed by the NRC, but the license was rescinded after the facility was shut down in 1986 (5).

The emissions of radioactive particulates at all three facilities were and are controlled by high efficiency particulate air (HEPA) filters. Eight ambient air samplers collect continuous samples at the SSFL. Radioactive releases are considered low by the DOE. Many of the samples collected measure near or below detection limits. The total radioactivity released in 1987 was less than one percent of DOE guidelines (5).

4. PROPOSED REVISED HRS CONSIDERATIONS

Rather than just determining if a release of contaminants to air has occurred, the proposed revised HRS addresses the potential for a release of contaminants to the air. Due to the volume and volatility of the hazardous substances used on-site, this factor could possibly increase the site's eligibility for inclusion on the National Priorities List.

The groundwater target population should not increase significantly due to increasing the radius of concern from three miles to four. The area within the extended radius is well developed and is uses imported surface water provided by the Metropolitan Water District of Southern California.

Because the surface water the distance of concern is increased from one mile to 15 miles from the site under the proposed revised HRS, additional sensitive environments will be considered. A federally listed endangered bird species, the least Bell's vireo has been observed in Arroyo Simi, and could potentially be disturbed by contaminant migration from the site.

The addition of an on-site pathway will not greatly increase the potential hazard from this site. The SSFL is isolated in rugged terrain and most of the facilities are fenced or guarded to prevent unauthorized entry. There are approximately 500 employees at the facility but no resident population to be affected by on-site exposure.

5. CONCLUSIONS

The Rockwell International Santa Susana Field Laboratory is divided into four areas that separate operations performed by Rockwell's Rocketdyne Division, the National Aeronautics and Space Administration, and the Department of Energy. The facility has been a research, development, and testing facility for rocket engines, lasers, and nuclear reactors for nearly 40 years. Chemicals used during these operations include organic solvents, primarily trichloroethylene, hydrazine fuels, oxidizers, kerosene-based fuels, and liquid metals such as sodium and potassium. In addition, asbestos, polychlorinated biphenyls, and hydraulic oil have been used throughout the facility. Because of the development of nuclear reactors in Area IV, radioactive wastes have also been stored on-site.

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A review of recent reports prepared to assess the hazard potential from various parts of the facility show that there are several waste management facilities at the site that may have introduced hazardous chemicals into the environment. There are eleven surface impoundments that are regulated under the Resource Conservation and Recovery Act of 1976 and are undergoing closure or have been closed. Approximately 870 tons of wastes, consisting of organic solvents, hydrazine fuels, oxidizers, and others, were released to nine of these ponds in 25 years of use. Most of these ponds had either inadequate or no linings.

In addition to surface impoundments, there were several waste and equipment storage areas where drums of wastes were stored possibly without proper spill containment. Two areas have released contamination to soil and/or groundwater, and pose a continuing threat to the environment. These areas are the Old Sodium Burn Pit and an area near the Sodium Burn Facility. Soil near the Burn Pit is contaminated with organic compounds, metals, polychlorinated biphenyls, metals, cesium-137, and other contaminants. Asbestos was found in a runoff sample taken behind the Sodium Burn Facility (Building 133).

Extensive groundwater testing has shown that the groundwater beneath the facility is contaminated with volatile organic compounds. Trichloroethylene has been found in one well at concentrations of at least 5,200 micrograms per liter. The maximum contaminant level for drinking water for trichloroethylene is 5 micrograms per liter. Off-site well testing has not shown any groundwater contamination migration away from the facility, although this may be due to a lack of effective off-site monitoring. There is extensive on-site groundwater pumpage that may be preventing groundwater flow from leaving the site.

Groundwater is not used as a primary source of drinking water within three miles of the site. Most of the area is provided with potable water by water purveyors that receive their water from the Metropolitan Water District of Southern California. The District imports the water from distant surface waters. There are potentially 400 private domestic wells within a three-mile radius of the site. It is possible, however, that many of these wells are inactive due to the current availability of municipal supplies and the relatively high salinity of the groundwater. The facility uses groundwater for sanitation, industrial, and cooling purposes, but provides bottled water for drinking.

Most of the surface water runoff from the site is regulated through the facility's water reclamation system. The facility has a discharge permit for two release locations that are tributary to the Los Angeles River. Surface water runoff from the northern ten percent of the facility may not be collected in the on-site system and drain into canyons leading into the Simi Valley. Two areas of soil contamination fall into this area and may contaminate runoff with polychlorinated biphenyls, organic solvents, metals, and asbestos. Surface water is not used for any purpose except possibly groundwater recharge, and then only in periods of high rainfall. There are no documented sensitive environments within one mile of the site, but a federally endangered species may reside in the Arroyo Simi, the drainage channel that site runoff enters three miles from the site.

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Most of the air emissions from the site are regulated by the Ventura County Air Pollution Control District. The district believes that hazardous emissions are not emanating from this facility. There is not enough information available to determine if there are uncontrolled releases of trichloroethylene and other solvents from test facilities and surface impoundments to the air. The radionuclide emissions released from the facility appear to be within guidelines established by the Department of Energy.

EPA RECOMMENDATION

While an abundance of data has been reviewed, additional information is required before EPA can conclude its evaluation of the facility under CERCLA. Specifically, analytical data is required to determine if uncontrolled releases of trichloroethylene and other solvents via the air pathway are occurring. Once data is collected, we will determine if the Rockwell International Santa Susana Field Laboratory qualifies for inclusion on the National Priorities List.

The National Aeronautics and Space Agency and the Department of Energy (both Federal Facilities) are requested to provide EPA with quantifiable air analytical data for Area II and Area IV, respectively. Each agency is required to assess the potential for likelihood of release of contaminants via the air route as outlined in the proposed revised Hazard Ranking System model (Federal Register, December 23, 1988).

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